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Voltammetric sensing and quantification of eugenol using nonionic surfactant self-organized media

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Abstract

Triton X100 and Brij® 35 based self-organized systems (at a concentration of 0.1 M) provide eugenol solubilization in water media. Eugenol is irreversibly oxidized on a glassy carbon electrode at 780 and 700 mV in 0.1 M LiClO4 in 0.1 M Triton X100 and Brij® 35 micellar media, respectively. Electrochemical oxidation of eugenol is a diffusion-controlled process that is confirmed by the linear dependence of peak currents on the v1/2 with R2 = 0.9968 and 0.9989 in Triton X100 and Brij® 35 media, respectively, and involves 2.0 ± 0.1 electrons corresponding to the formation of o-quinone. The eugenol calibration graph is linear in the range 15-1230 μM with an estimated detection limit of 3.8 μM and a quantification limit of 12.6 μM. The addition of ethanol (10% v/v) to a 0.1 M Triton X100 micellar medium leads to the cathodic shift of eugenol oxidation potential of 50 mV. Under these conditions, the oxidation current linearly depends on the eugenol concentration in the range 0.02-1.0 mM with a detection limit of 0.01 mM. The recovery of eugenol determination in test solutions is in the range 99.0-101.2%. The preliminary extraction of eugenol with ethanol is used for its voltammetric determination in spices. Quantitative determination of eugenol in essential oils in a Triton X100 micellar medium has been carried out. The results obtained for real samples are in good agreement with data from independent spectrophotometric methods.

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